

U.S.S.N. 10/700,973

REMARKS

Thorough examination by the Examiner is noted and appreciated.

The claims have been amended to further clarify Applicants invention. No new matter has been added.

Support for the claim amendments are found in the original and previously presented claims, the Figures, and in Specification e.g., at:

Beginning at line 5, page 3 (paragraphs 0007 and 0008 published version):

"An important feature of the invention is that minimum use is made of the fuel cell to maintain the battery pack's SOC charge within a desired window. The **control strategy shares the power sourced from the fuel cell and the battery pack to the load** in a manner that optimizes the use of the fuel cell, thereby conserving fuel and lengthening the service life of the battery.

Another feature of the invention is that the power output of the battery pack is regulated based on load demand relative to the fuel cell's ability to satisfy this demand. By **reducing the amount of power supplied to the load from the battery pack at certain times and using the fuel cell to satisfy any remaining portion of the demanded power**, fuel cell

U.S.S.N. 10/700,973

use is optimized while maintaining the charge of the battery pack within a desired range."

At line 4, page 9 (paragraph 0055 published version):

"The control strategy sought is one that minimizes the power output from the fuel cell 10, which in turn minimizes the fuel used, while maintaining operation within a pre-defined charge carrier SOC window."

Beginning at page 7, line 31:

"The control method is carried out by setting the charge carrier 16 power output, based on the previous SOC level, to the following

$$P_{CC}(k) = (n_{CC}(k) * V_{FC}^{MAX}) / (2 * S * V_{FC}(k)) + C(k-1) - C_{NOM}$$

if the power required by the system loads 14 is less than the maximum power available from the fuel cell 10 and

$$P_{CC}(k) = -(P_{LOAD}(k) + P_{FC}^{MAX})$$

if the power required by the system loads 14 is equal to or greater than the maximum power available from the fuel cell 10 and the fuel cell is operating at its maximum power output. Simulation testing has shown that this control method considerably decreases the power supplied by the fuel cell 10 over time, when compared to the use of the charge carrier 16 only as an additional power source for fuel cell short falls, and as a sink for regenerative braking. This control strategy would therefore lead to a proportional increase in fuel economy."

#### Rejections Under 35 USC § 112

1. Claims 1-6 and 20-33 stand rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement.

U.S.S.N. 10/700,973

Examiner contends that the limitation "said first and second value are greater than zero" is not supported by the portions of the specification previously recited by Applicants.

It is noted Examiner does not contend that the new limitations are not unsupported by Applicants specification.

Examiner does not explain how or why one of ordinary skill in the art would not understand that the first and second values of output power of the charge carrier in a **power sharing control strategy between the fuel cell and the charge carrier** (see paragraph beginning at line 25, page 6; or paragraph 0021 published version), **were to be greater than zero** as clearly explained by Applicants in the Specification at, e.g.:

Beginning at page 7, line 31 (or paragraph 0049 published version):

"The control method is carried out by **setting the charge carrier 16 power output**, based on the previous SOC level, to the following

$$P_{cc}(k) = (n_{cc}(k) * V_{fc}^{MAX}) / (2 * S * V_{fc}(k)) + C(k-1) - C_{NOM}$$

if the power required by the system loads 14 is less than the maximum power available from the fuel cell 10 and

U.S.S.N. 10/700,973

$$P_{CC}(k) = -(P_{LOAD}(k) + P_{FC}^{MAX})$$

if the power required by the system loads 14 is equal to or greater than the maximum power available from the fuel cell 10 and the fuel cell is operating at its maximum power output. Simulation testing has shown that this control method considerably decreases the power supplied by the fuel cell 10 over time, when compared to the use of the charge carrier 16 only as an additional power source for fuel cell short falls, and as a sink for regenerative braking. This control strategy would therefore lead to a proportional increase in fuel economy."

Examiner does not explain how or why one of ordinary skill would not understand from the above description (in the context of the entire disclosure) including Figure 5, paragraph 0021 that the equations above describes a first and second value of a charge carrier output greater than zero, i.e., the quantity  $P_{CC}(k) = -(P_{LOAD}(k) + P_{FC}^{MAX})$  defines a positive quantity (see paragraph 0054; or line 3, page 9).

Beginning at line 5, page 3 (paragraphs 0007 and 0008 published version):

"An important feature of the invention is that minimum use is made of the fuel cell to maintain the battery pack's SOC charge within a desired window. The control strategy shares the power sourced from the fuel cell and the battery pack to the load in a manner that optimizes the use of the fuel cell, thereby conserving fuel and lengthening the service life of the battery.

Another feature of the invention is that the power output of the battery pack is regulated based on load demand relative to the fuel cell's ability to satisfy this demand. By

U.S.S.N. 10/700,973

reducing the amount of power supplied to the load from the battery pack at certain times and using the fuel cell to satisfy any remaining portion of the demanded power, fuel cell use is optimized while maintaining the charge of the battery pack within a desired range."

Therefore, it is clear to one of ordinary skill that the Applicants first and second values are greater than zero in order to accomplish the clearly stated operation of Applicants invention including the power sharing operation between the charge carrier and the fuel cell.

Examiner is respectfully referred to the following portions of the MPEP:

Applicants respectfully refer Examiner to the following relevant portions of the MPEP and the case law:

**ADEQUACY OF WRITTEN DESCRIPTION**

***A. Read and Analyze the Specification for Compliance with 35 U.S.C. 112, para. 1***

Office personnel should adhere to the following procedures when reviewing patent applications for compliance with the written description requirement of 35 U.S.C. 112, para. 1. The examiner has the initial burden, after a thorough reading and evaluation of the content of the application, of presenting evidence or reasons why a person skilled in the art would not recognize that the written description of the invention provides support for the claims. There is a strong presumption that an adequate written description of the claimed invention is present in the specification as filed, *Wertheim*, 541 F.2d at 262, 191 USPQ; however, with respect to newly added or claims, applicant should show support in the disclosure for the new or amended claims.

U.S.S.N. 10/700,973

"[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." *In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968)

It is now well accepted that a satisfactory description may be in the claims or any other portion of the originally filed specification.

See MPEP, 8<sup>th</sup> Ed, Section 2163 (I)

While there is no *in haec verba* requirement, newly added claim limitations must be supported in the specification through **express, implicit, or inherent disclosure.**

See MPEP, 8<sup>th</sup> Ed, Section 2163 (I) (B)

The fundamental factual inquiry is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, applicant was in possession of the invention as now claimed. See, e.g., *Vas-Cath, Inc.*, 935 F.2d at 1563-64, 19 USPQ2d at 1117.

Possession may be shown in many ways. For example, possession may be shown by **describing an actual reduction to practice of the claimed invention.** Possession may also be shown by a clear depiction of the invention in detailed drawings or in structural chemical formulas which permit a person skilled in the art to clearly recognize that applicant had possession of the claimed invention. An adequate written description of the invention may be shown by **any description of sufficient, relevant, identifying characteristics so long as a person skilled in the art would recognize that the inventor had possession of the claimed invention.** See, e.g., *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323, 56 USPQ2d 1481, 1483 (Fed. Cir. 2000)

Thus, while Examiner has failed to demonstrate or make out a *prima facie* case that Applicants amendment, including the first and second values greater than zero, has violated

U.S.S.N. 10/700,973

the written description requirement or is new matter, Applicants has amended the claims to more clearly state that the first value is greater than zero and the second value is greater than zero.

Rejections Under 35 USC § 102

2. Claims 1, 2, 5, and 20-22 stand rejected under 35 USC § 102(a) as being anticipated by Sugiura (US 2003/0118876).

Sugiura teaches supplying power from the secondary battery when the SOC of the secondary battery is **sufficiently large and the size of the load exceeds or equals a predetermined upper limit of the fuel cell output** (see paragraph 0047) and where the battery is the sole source of power (**fuel cell operation suspended**) when load requirements are low and where fuel cell efficiency has declined in order to maintain operating energy efficiency as a whole (see paragraphs, 0006, 0009, 0055, 0056). Sugiura further teaches that the fuel cell may also supply power to recharge the secondary battery **if the secondary battery SOC falls below a predetermined level** and the size of the load is relatively small so that the fuel cell has spare power to output (paragraph 0048).

Thus, Sugiura fails to disclose several elements of Applicants invention including those elements in **bold type**:

"A method of controlling the operation of hybrid power system having a fuel cell and a charge carrier comprising a DC

U.S.S.N. 10/700,973

electrical energy source, said fuel cell and said DC electrical energy source for supplying power to a load, comprising the steps of:

(A) **determining a state of charge of the charge carrier wherein said state of charge is within a preselected operating range;**

(B) **setting a power output of the charge carrier to output power at a first value greater than zero if the power required by the load is less than the maximum power output available to be supplied from the fuel cell wherein the fuel cell is operating at less than said maximum power output; and,**

(C) **setting the power output of the charge carrier to output power at a second value greater than zero if the power required by the load is equal to or greater than the maximum power output available to be supplied from the fuel cell wherein the fuel cell is operating at said maximum power output."**

Sugiura nowhere teaches operating the secondary battery to supply power when the fuel cell is **operating at less than said maximum power output and the state of charge of the secondary battery is within a preselected operating range;** rather Sugiura only teaches operating the secondary battery when necessary to **supply additional power** when the fuel cell



U.S.S.N. 10/700,973

is operating at maximum power and when necessary to recharge the secondary batter **when it has dropped below an SOC operating range.**

Thus, Sugiura is clearly insufficient to anticipate Applicants invention.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

*Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

"The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

#### **Rejections Under 35 USC § 103**

3. Claims 3, 23, 24, 26-29, 30, 32, and 33 stand rejected under 35 USC § 103(a) as being unpatentable over Sugiura, above, further in view of Hochgraf (US 2003/0044658).

Applicants reiterate the comments made above with respect to Sugiura.

Even assuming arguendo a proper motivation for modifying Sugiura with the teachings of Hochgraf, the fact that Hochgraf disclose a fuel cell connected in parallel to a load and where the fuel cell voltage is controlled to make it compatible with

U.S.S.N. 10/700,973

the voltage characteristics of the energy storage device (battery) (i.e., no power conversion) (paragraph 006) as a function of the load current and SOC of the battery and where the SOC of the battery is operated over a desired range including up to 100 % SOC and **where the load current is supplied entirely by the fuel cell** (paragraph 0050), does not further help Examiner in producing Applicants invention.

Moreover, modifying Sugiura to control the SOC of the battery **where the load current is supplied entirely by the fuel** would change the principle of operation of the method of Sugiura (having battery supply additional energy only when the load requirement exceeds the fuel cell capability) and make the method and device of Sugiura unsuitable for its intended purpose (having battery supply additional energy only when the load requirement exceeds the fuel cell capability), and still would not produce Applicants invention.

"If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious." *In re Ratti*, 270 F.2d 810, 123, USPQ 349 (CCPA 1959).

"If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

U.S.S.N. 10/700,973

"First, there must be some **suggestion or motivation**, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. **Second**, there must be a **reasonable expectation of success**. **Finally**, the prior art reference (or references when combined) **must teach or suggest all the claim limitations**. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." In re *Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

4. Claims 25 and 31 stand rejected under 35 USC § 103(a) as being unpatentable over Sugiura in view of Hochgraf, above, as evidenced by Ulmer (US 2005/0069740).

Applicants reiterate the comments made above with respect to Sugiura and Hochgraf.

The fact that Sugiura teaches that a secondary battery supplies power to a load when the SOC of the secondary battery **is sufficiently large and the size of the load exceeds or equals a predetermined upper limit of the fuel cell output** (see paragraph 0047) and where the output voltage of the **fuel cell correspondingly decreases** as the secondary battery output voltage increases, and **where the fuel cell supplies no power to the load** (only the battery supplies power to the load) when

U.S.S.N. 10/700,973

**the load requirement is low** (see Abstract), does not further help Examiner in producing Applicants invention.

The fact that Hochgraf discloses the fuel cell voltage is controlled to be compatible with the voltage characteristics of the energy storage device (battery) (i.e., no power conversion) (paragraph 006) as a function of the load current and SOC of the battery and where the SOC of the battery is operated over a desired range including up to 100 % SOC **where the load current is supplied entirely by the fuel cell** (paragraph 0050), does not further help Examiner in producing Applicants invention.

The fact that Ulmer teaches a definition and equation for fuel cell voltage does not help Examiner in producing Applicants invention.

**"First**, there must be some **suggestion or motivation**, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. **Second**, there must be a **reasonable expectation of success**. **Finally**, the prior art reference (or references when combined) **must teach or suggest all the claim limitations**. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

U.S.S.N. 10/700,973

Conclusion

The cited references fail to produce or suggest Applicants invention, and are therefore insufficient to make out a *prima facie* case of anticipation or obviousness.

Applicants have amended the claims to further clarify their invention and define over the prior art.

Based on the foregoing, Applicants respectfully request favorable consideration of Applicants claims and submit that Applicants Claims are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.

In the event that the present invention as claimed is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicant's representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,

**TUNG & ASSOCIATES**

Randy W. Tung  
Reg. No. 31,311  
Telephone: (248) 540-4040